



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,529	10/29/2003	Philip Bruce Henderson	06398 USA	6382

23543 7590 02/09/2005

AIR PRODUCTS AND CHEMICALS, INC.
PATENT DEPARTMENT
7201 HAMILTON BOULEVARD
ALLENTOWN, PA 181951501

EXAMINER

WITHERSPOON, SIKARL A

ART UNIT	PAPER NUMBER
----------	--------------

1621

DATE MAILED: 02/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/696,529	Applicant(s) HENDERSON ET AL.	
	Examiner Sikar A. Witherspoon	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/29/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by JA 55-154925.

JA-55-154925 discloses "highly pure" perfluoromethane, i.e., about 99.99% perfluoromethane using a reactor and a small-scale laser. The process by which the perfluoromethane was obtained in the instant claims has not been given much patentable weight, and as such, the perfluoromethane of 99.99% purity disclosed in JA-55-154925 anticipates the instant claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, and 4-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamhankar et al (US 5,417,742) and Li (US 6,187,077) in combination.

The instant claims are drawn to a method for removing perfluoroethane from a gas mixture comprising perfluoroethane and one or more other fluorocarbon compounds, by contacting the gas mixture with an adsorbent comprising zeolite of the mordenite structure, wherein at least a portion of the perfluoroethane is adsorbed by the adsorbent, and withdrawing a perfluoroethane-depleted gas product from contact with the adsorbent. Further limitations include the zeolite adsorbent having a silicon to aluminum atomic ratio of less than about 50; the other fluorocarbon in the gas mixture being perfluoromethane, the method comprising a pressure swing adsorption or a temperature swing adsorption.

Tamhankar et al teach a process for the removal of perfluorocarbons from gas streams, wherein the gas stream is subjected to an adsorption process in a bed of one or more adsorbents, wherein the adsorbent may be of the mordenite structure (MOR), and the adsorption is preferably a pressure swing or temperature swing adsorption (abstract). The preferred adsorbents are type beta zeolite and dealuminated mordenite, having a silicon to aluminum ratio of *at least* 50. The particular adsorption process is not critical, and pressure swing, temperature swing or combination adsorptions are used. The adsorption is preferably carried out in a battery of two or more adsorption beds arranged in parallel, and operated out of phase, so that at least one bed is undergoing adsorption, while the other bed is being regenerated (col. 2, lines 7-31). According to the process, perfluorocarbons are separated from one or more permanent gases such as nitrogen, oxygen, argon, helium, krypton, hydrogen, and carbon monoxide (col. 3, lines 13-19). Column 5, line 25 to column 6, line 20 details the

Art Unit: 1621

conditions for the adsorption and regeneration using a pressure swing adsorption and temperature swing adsorption. Examples 1 and 2 detail the separation of perfluoroethane from a gas comprising perfluoromethane and nitrogen.

The differences between Tamhankar et al and the instant claims are that Tamhankar et al do not teach a silicon to aluminum ratio of less than about 50, and do not teach a perfluoroethane-depleted gas that comprises at least 99.99 vol% of perfluoromethane.

Li teaches the separation of perfluoromethane and perfluoroethane from a perfluorocompound mixture, employing pressure swing adsorption or temperature swing adsorption, wherein a stream comprising 60 to about 99% of at least one of perfluoromethane or perfluoroethane is obtained. Li also teaches a silicon to alumina molar ratio of 1 to 1 to 100 to 1 (col. 4, lines 43-45).

It therefore would have been obvious to a person of ordinary skill in the art, in view of the combined reference teachings, to employ a molar ratio of silicon to alumina that is between 1 and 100 in the adsorbent, since the combined reference teachings leads one of ordinary skill to believe that any ratio within this range would be effective in adsorbing perfluorocarbons from gas streams comprising them.

It also would have been obvious to modify the conditions of the adsorption to obtain perfluoromethane of at least 99.99 vol%, if one so desired, since Li teaches that a stream comprising at least one of perfluoromethane and perfluoroethane, at 60 to 99% can be obtained.

Art Unit: 1621

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamhankar et al and Li as applied to claim 1, 2, and 4-15 above, and further in view of Segawa et al (US 5,210,308).

The instant claim is drawn to the decationization of the zeolite adsorbent such that at least 50 % of the cations are replaced with protons. Neither Tamhankar et al or Li teach this particular limitation. However, Segawa et al teach the conversion of zeolite of the mordenite type to an H-mordenite, by ion exchange, wherein a mordenite adsorbent comprising sodium cations is decationized to replace the sodium with protons.

It would have been obvious to a person of ordinary skill in the art to decationize the mordenite adsorbent taught by Tamhankar et al by replacing the cations with protons, as taught by Segawa et al, in view of the combined reference teachings. One of ordinary skill would have been motivated to decationize the mordenite adsorbent taught by Tamhankar et al, hence employ an H-mordenite in their process, by the desire to employ a more highly reactive mordenite adsorbent, since Segawa et al teach that H-mordenite is more reactive than the cationized mordenite (Segawa et al, col. 3, lines 35-60).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikarl A. Witherspoon whose telephone number is 571-272-0649. The examiner can normally be reached on M-F 8:30-6:30.

Art Unit: 1621

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Sikarl A. Witherspoon
Patent Examiner
Technology Center 1600